CLAIMS

We claim:

1. A method for modeling nonlinear diffusion of a multicomponent system in heterogeneous media.

2. The method of claim 1, further comprising the step of applying a Lagrange multiplier method for treating the nonlinear partition coefficient of one or more components included in the multicomponent system.

3. The method of claim 1, wherein the method is applied to multicomponent diffusion through two or more subdomains and the diffusion coefficients and partition coefficients in each subdomain are respectively taken to be

$$\boldsymbol{D}^i = \begin{bmatrix} D_{11}^i(c_1^i, c_2^i) & D_{12}^i(c_1^i, c_2^i) \\ D_{21}^i(c_1^i, c_2^i) & D_{22}^i(c_1^i, c_2^i) \end{bmatrix}$$

$$\frac{1}{\boldsymbol{k}^i} = \begin{bmatrix} \dfrac{1}{k_{11}^i(c_1^i, c_2^i)} & 0 \\ 0 & \dfrac{1}{k_{22}^i(c_1^i, c_2^i)} \end{bmatrix}$$

where $c_1^i = c_1^i(x,t),\ c_2^i = c_2^i(x,t)$.

4. A method for modeling nonlinear diffusion of a drug and a permeation enhancer in a heterogeneous transdermal system.

5. The method of claim 4, further comprising the step of applying a Lagrange multiplier method for treating the nonlinear partition coefficient of one or more components included in the multicomponent system.

6. The method of claim 5, wherein the method is applied to diffusion of the drug and the permeation enhancer through two or more subdomains and the diffusion coefficients and partition coefficients of the drug and the permeation enhancer in each subdomain are respectively taken to be

$$\boldsymbol{D}^i = \begin{bmatrix} D_{11}^i(c_1^i, c_2^i) & D_{12}^i(c_1^i, c_2^i) \\ D_{21}^i(c_1^i, c_2^i) & D_{22}^i(c_1^i, c_2^i) \end{bmatrix}$$

$$\frac{1}{\boldsymbol{k}^i} = \begin{bmatrix} \dfrac{1}{k_{11}^i(c_1^i, c_2^i)} & 0 \\ 0 & \dfrac{1}{k_{22}^i(c_1^i, c_2^i)} \end{bmatrix}$$

where $c_1^i = c_1^i(x,t),\ c_2^i = c_2^i(x,t)$.